

1. Requirements	2
1.1 F01 - Develop task	5
1.2 F02 - Manage tasks	7
1.3 F03 - Quality assure task	8
1.4 F04 - Administer pilot of task (item)	9
1.5 F05 - Create test	10
1.6 F06 - Create version of test	11
1.7 F07 - Approve test/ examination paper	12
1.8 F08 - Connect test to event	13
1.9 F09 - Manage test writers	14
1.10 F10 - Student prepare for test	15
1.11 F11 - Pupil sit test	16
1.12 F12 - Pupil sit reading test	17
1.13 F13 - Student sit examination	18
1.14 F14 - Restricted mode	19
1.15 F15 - Monitoring of test	20
1.16 F16 - Invigilate examination	21
1.17 F17 - Supervision of test event	22
1.18 F18 - Manual marking	23
1.19 F19 - Comment on scoring	24
1.20 F20 - Analysis	25
1.21 F21 - Grading	26
1.22 F22 - Create assessment criteria/ matrix	27
1.23 F23 - Review of results	28
1.24 F24 - Manage data	29
1.25 IF01 - Avoid unnecessary steps	30
1.26 IF02 - Time behaviour	31
1.27 IF03 - Simultaneous users	32
1.28 IF04 - Integrations with other systems	33
1.29 IF05 - User interface	36
1.30 IF06 - Supported devices	37
1.31 IF07 - Accessibility	38
1.32 IF08 - User experience	39
1.33 IF09 - Error messages	40
1.34 IF10 - Recoverability	41
1.35 IF11 - Availability	42
1.36 IF12 - Access to data	43
1.37 IF13 - Location of data	44
1.38 IF14 - Transportation of data	45
1.39 IF15 - Test environments	46
1.40 IF16 - Documentation	47
2. Glossary	48

Requirements

Requirements for the system in the form of user stories.

Title	Phase	Who	What	Why
F01 - Develop task	Production	Test writer	Develop tasks of different types and look	Create tasks with the correct attributes/ behaviour/ appearance for measuring a given competence
F02 - Manage tasks	Production	Test writer	Manage tasks	Refine, improve and keep tasks up to date
F03 - Quality assure task	Production	Task quality assurer	Assess and give comments on a task and test	Give feedback to test writer on improvements that can be made on the task
F04 - Administer pilot of task (item)	Production	Test writer	Administer a task to a representative group of students	Find characteristics of the task for further improvement of task
F05 - Create test	Production	Test writer	Collate tasks	To create a test or unit of items
F06 - Create version of test	Production	Translator / Special needs expert	Create a version (language, specially adapted) of an approved test	To prepare a test for all user groups
F07 - Approve test/ examination paper	Production	Test writer	Approve final version of test/ examination with all language versions and variations	Finalise test/ examination paper for administration
F08 - Connect test to event	Production	Test manager	Connect test to the event in PAS	Make the test available to enrolled students
F09 - Manage test writers	Production	Test Manager	Manage test writers and their access levels	To control who has access to tests and examinations in production and make sure no one else has access
F10 - Student prepare for test	Administration	Student	Prepare for test or exam	To get the appropriate mindset.
F11 - Pupil sit test	Administration	Pupil	Sit a test (mapping/ national/ formative)	To show their level of competence/ skill
F12 - Pupil sit reading test	Administration	Pupil	Sit a reading test	To show their level of reading skill
F13 - Student sit examination	Administration	Student	Sit an examination	To show level of competence in a specific subject
F14 - Restricted mode	Administration	Student/ pupil	Sit an examination/ test in a technically restricted environment	To avoid unnecessary distractions, to control which tools are available and to prevent cheating.

F15 - Monitoring of test	Administration	Teacher	Monitor the administration of a test in the classroom	To help students solve their tasks and help them administer their time.
F16 - Invigilate examination	Administration	Invigilator	Invigilate the administration of a test	Check identity, monitor progress (start, delivery, remaining time), technical monitoring and administrative assistance to students.
F17 - Supervision of test event	Administration	Test manager	Supervise administration of test on a high level	Make sure all students get to participate in a test event
F18 - Manual marking	Analysis	Marker	Assess single answers and give them a score accordingly	To allow for open ended tasks to be used in assessment, and to prepare for analysis of tests
F19 - Comment on scoring	Analysis	Teacher/ Grader	Assess automatically scored answers and give feedback if changes should be considered	The items might have partially correct answers, or faulty scoring setup.
F20 - Analysis	Analysis	Psychometrician	Perform analysis of test	Create foundation for reports, analysis, grading for tests and examinations.
F21 - Grading	Analysis	Grader	Assess complete exam delivery and set an examination grade	To give the student a fair and correct examination grade
F22 - Create assessment criteria/ matrix	Analysis	Test writer/ Test manager	Finalise assessment criteria/ matrix initiated by the test writer, commented on by graders and analysed by the psychometrician.	To give the graders a fair and correct way to grade the examinations.
F23 - Review of results	Analysis	Teacher	View student responses	To review performance and see achieved score in context
F24 - Manage data	Analysis	Manager	Export, archive, delete, manage data collected and stored in all part of the system.	To make sure data collected is handled according to mandate and legislation.

Non-functional requirements.

Title	Name	Description
IF01 - Avoid unnecessary steps	Avoid unnecessary steps	A user should only be presented with the necessary steps to complete a task, not any unnecessary steps.
IF02 - Time behaviour	Time behaviour	Response and processing times and throughput rates when the system performs its functions must be fast.
IF03 - Simultaneous users	Simultaneous users	The solution must handle that the Customer has administration of a large number of simultaneous examination or test, with associated support (teachers, invigilators and the like).
IF04 - Integrations with other systems	Integrations with other systems	The system must integrate with the Customer's system portfolio (according to table below).
IF05 - User interface	User interface	The user interface must be customisable to adhere to the Customer's design and language requirements.
IF06 - Supported devices	Supported devices	The system must be available on most common devices and browsers.
IF07 - Accessibility	Accessibility	The system must be universally accessible.
IF08 - User experience	User experience	Use of the system on different devices and with different support tools should not detract the user experience.
IF09 - Error messages	Error messages	Error messages should be descriptive and meaningful for end users.
IF10 - Recoverability	Recoverability	The system must be recoverable, and be able to recover data affected by an event of interruption or system failure.
IF11 - Availability	Availability	The system must be available during test and examination administration.
IF12 - Access to data	Access to data	The system must control that only those who should have access to production data get access to it.
IF13 - Location of data	Location of data	Data cannot be stored outside EU/ EEA
IF14 - Transportation of data	Transportation of data	All transportation of data must be encrypted.
IF15 - Test environments	Test environments	A staging environment must be available and configured to communicate with the Customer's systems staging environments.
IF16 - Documentation	Documentation	The system must be well documented.

F01 - Develop task

ID	F01
Who	Test writer
What	Develop tasks of different types and look
Why	Create tasks with the correct attributes/ behaviour/ appearance for measuring a given competence
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B01 - Mapping	F01.1: Mapping tests require suitable task types e.g. graphical item types. F01.2: It should be possible to configure time restrictions / time recommendations for a task.
B02 - Assess skills	F01.3: Reading skills require suitable task types. F01.4: Reading skills require "document stimuli" editing functionality for this document must be rich. F01.5: Listening skills require suitable task types. F01.6: Numeracy skills require suitable task types. F01.7: Writing skills require suitable task types.
B03 - Adaptivity/ differentiation	F01.8: Test writers should have suitable tools for making tasks for adaptive tests.
B07 - Case	F01.9: Test writer should be able to design open text tasks with rich text capabilities. F01.10: A case task should have the possibility to use of sketches in both task and answer.
B08 - The nature of the subjects	F01.11: Different subjects require suitable task types. F01.12: It should be able to import/get access to complex item types (PCI etc.) F01.13: Test writer should be able to define access to third party tools. F01.14: Test writer should be able to define access to built in tools. F01.15: The test writer must be able to create content writing from the right to the left F01.16: The test writer must be able to create items in different languages (including languages not using the Latin alphabet)

B13 - Accessibility	F01.17: The system must assist the test writer to develop tasks that are universally accessible.
B16 - Assessment criteria	F01.18: Test writers should be able to add assessment criteria to the tasks they develop. F01.19: It must be possible to meta tag item. F01.20: It should be possible to meta tag item alternatives / scores.
B17 - Quality assurance	F01.21: Test writers work together in teams of two or more persons. Everyone on the team must have access to the tasks being developed.
B19 - Continuous improvement	F01.22: Test writers should get feedback from analysis of previous tests/ examinations. F01.23: Test writers should get feedback from graders of previous tests/ examinations. F01.24: Test writers should get feedback from students/ student behaviour of previous tests/ examinations.
B20 - Intuitive for external users	F01.25: Due to the high number of test writers, task types must be easy to create and intuitive to configure. F01.26: Test writers not familiar with suitable task types should get suggestions or have access to simple introductions or templates. F01.27: Test writer must be able to preview task content, functionality and behaviour in context of exam type (e.g. open/ closed) and device.
B21 - Scoring	F01.28: Test writer must be able to define criteria and possible outcomes for manual marking.
B22 - The subject curriculum	F01.29: Test writers need to link (tag) test/ examination content to the subject curriculum. F01.30: The test writer must be able to link (tag) tasks with other relevant meta data (e.g. taxonomy).
B23 - Integrations	F01.31: Test writer user role must be derived from the Customer's management system. F01.32: Test writer user role must be managed in the system and updated in the Customer's management system. F01.33: The system must have functionality for access restriction and shared items (test writer authorisation must be handled by the system).
B27 - Multimedia	F01.34: Test writers must be able to integrate multimedia (e.g. images, video, maps, sound) in tasks. F01.35: Test writers must be able to use advanced formatting in tasks (do we need to set requirements to the richness of the task editor?).
B30 - Information security	F01.36: Tasks, tests and examination papers must not be exposed or leaked.

F02 - Manage tasks

ID	F02
Who	Test writer
What	Manage tasks
Why	Refine, improve and keep tasks up to date
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B03 - Adaptivity/ differentiation	F02.1: Test writers should be able to manage tasks for an item bank for use in adaptive testing.
B16 - Assessment criteria	F02.2: It should be possible to manage assessment criteria across tasks.
B17 - Quality assurance	F02.3: Test writers should be able to see where an item has been used, and where previous versions of the item has been used. F02.4: Test writers should be able to see item characteristics from piloting or previous administration. F02.5: Items must have revision history.
B19 - Continuous improvement	F02.6: Management of tasks based on data from analysis should be possible.
B22 - The subject curriculum	F02.7: Links to curriculum should be available when managing tasks.

F03 - Quality assure task

ID	F03
Who	Task quality assurer
What	Assess and give comments on a task and test
Why	Give feedback to test writer on improvements that can be made on the task
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B17 - Quality assurance	F03.1: Manual QA of tasks should be available throughout the lifecycle of a task. F03.2: Quality assurer should get a read only version of the task. F03.3: Quality assurer should have the possibility to add comments to tasks F03.4: Revision/ version history of review and changes should be available for a task.

F04 - Administer pilot of task (item)

ID	F04
Who	Test writer
What	Administer a task to a representative group of students
Why	Find characteristics of the task for further improvement of task
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B17 - Quality assurance	F04.1: It must be possible to administer tasks in dedicated piloting tests. F04.2: It should be possible to pilot tasks by insertion in a live test (e.g. one year in advance, possibility of piloting tasks in ongoing tests). F04.3: It should be possible to export data for analysis.
B10 - Basic skills	F04.4 Anchor tasks and pilot tasks must be hidden from preview and reports.

F05 - Create test

ID	F05
Who	Test writer
What	Collate tasks
Why	To create a test or unit of items
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B03 - Adaptivity/ differentiation	F05.1: It should be possible to set up an adaptive test based on item characteristics or metadata.
B05 - Showing competence on the examination	F05.2: It should be possible to publish a test for demo/ practice use (with no required log in).
B06 - Final assessment	F05.3: It should be possible to configure which external resources (e.g. third tools or internet) are available for the student in restricted mode.
B08 - The nature of the subjects	F05.4: The test writer should be able to define navigation behavior and restriction.
B22 - The subject curriculum	F05.5: The test writer should be able to link the test to curriculum.
B25 - Access to technical aids / support	F05.6: The test writer must be able to define which technical aids the student can use while taking exam.
B28 - Independence on equipment	F05.7: The test writer must be able to preview configured test.

F06 - Create version of test

ID	F06
Who	Translator / Special needs expert
What	Create a version (language, specially adapted) of an approved test
Why	To prepare a test for all user groups
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B13 - Accessibility	F06.1: It must be possible to create versions of tests for student groups with needs that are not covered by universal accessibility.
B14 - Languages	F06.2: It must be possible to create language versions of tests. F06.3: The system should have system support for translations of content.

F07 - Approve test/ examination paper

ID	F07
Who	Test writer
What	Approve final version of test/ examination with all language versions and variations
Why	Finalise test/ examination paper for administration
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B17 - Quality assurance	F07.1: Approval of test/ examination paper should include information about what QA has been performed.
B20 - Intuitive for external users	F07.2: Due to the high number of test writers, approving their finished product must be easy.
B23 - Integrations	F07.3: Approving a test/ exam should make it accessible to test management functionality in PAS.

F08 - Connect test to event

ID	F08
Who	Test manager
What	Connect test to the event in PAS
Why	Make the test available to enrolled students
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B23 - Integrations	F08.1: When connecting test to event, the manager must be presented with enough information to be able to select the correct test and event (E.g. list of test must have relevant information). See IF04 - Integrations with other systems for system integrations.

F09 - Manage test writers

ID	F09
Who	Test Manager
What	Manage test writers and their access levels
Why	To control who has access to tests and examinations in production and make sure no one else has access
Phase	Production

This requirement is connected to these needs:

Need	Relevance
B02 - Assess skills	F09.1: Test manager must be able to manage access to tests for test writers.
B06 - Final assessment	F09.2: Test manager must be able to manage access to examinations for test writers.
B14 - Languages	F09.3: Test manager must be able to manage access for translators.
B17 - Quality assurance	F09.4: Test manager must be able to manage access to content for quality assurance personnel.
B23 - Integrations	F09.5: System must sync with and update roles in the Påloggingssystemet.

F10 - Student prepare for test

ID	F10
Who	Student
What	Prepare for test or exam
Why	To get the appropriate mindset.
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B04 - Age range	F10.1: The youngest pupils should have access to demo tests.*
B05 - Showing competence on the examination	F10.2: The student should be able to access subject related content such as demo tests or tests that have been made available.* F10.3: Students must have access to demo exams*

[* These tests are not considered student deliveries and will be included in the monthly fee.]

For examples of demo/ practice tests and examinations see Tender Specification, Attachment 5 - Links to relevant test and examinations.

F11 - Pupil sit test

ID	F11
Who	Pupil
What	Sit a test (mapping/ national/ formative)
Why	To show their level of competence/ skill
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B04 - Age range	F11.1: Starting a test must be easy and with few steps for young pupils because they are unfamiliar with administration of tests. F11.2: It should be easy and self explanatory for the pupils to enter their response. F11.3: Delivering a test must be easy for young pupils so that their results are collected no matter "what they do". Automatic delivery should be considered.
B13 - Accessibility	F11.4: Solving tasks must be easy and the system must not impose barriers for students with special needs. F11.5: The test player should hold the highest level of accessibility for most common item types.

F12 - Pupil sit reading test

ID	F12
Who	Pupil
What	Sit a reading test
Why	To show their level of reading skill
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B02 - Assess skills	F12.1: On the national reading test, it must be possible to use one text as stimuli for a group of tasks (side by side / over under). F12.2: It should be possible to annotate and highlight stimuli.
B13 - Accessibility	F12.3: Presentation of stimuli, tasks and navigation at one screen at the same time must be made to be universally accessible.

Example of existing reading test:

<https://pgsc.udir.no/kursweb/content?contentItemId=45300335&marketplaceId=624075&selectedLanguageId=1>

F13 - Student sit examination

ID	F13
Who	Student
What	Sit an examination
Why	To show level of competence in a specific subject
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B05 - Showing competence on the examination	F13.1: Starting an exam must be easy for students because they should focus on the examination subject. F13.2: Student should have the possibility for noting and highlighting information in the study material. F13.3: It should be possible to mark a task for revisiting.
B07 - Case	F13.4: Students must be able to use a number of study materials when solving case tasks/scenario based task types.
B08 - The nature of the subjects	F13.5: Solving tasks in third party tools must be either integrated or have possibility for upload of answer. F13.6: Student must be able to give a long text answer with a rich text editor. F13.7: The student must be able to give answers writing from the right to the left on tasks and assignments that require this. F13.8: The student must be able to give answers writing in different languages (including languages not using the Latin alphabet). F13.9: The student should be able to draw sketches as part of their delivery.
B14 - Languages	F13.10: Built in functionality (e.g. spell-checkers) must support official languages.
B16 - Assessment criteria	F13.11: The student should have access to / be presented with the assessment criteria of a task.
B18 - Proctoring	F13.12: The student should have the possibility to send a message to the teacher/ invigilator (toilet break/ subject assistance request).
B24 - Technical availability	F13.13: Solving tasks must be available to the student throughout the whole test/ examination (100 % "uptime" or with a good backup solution).
B25 - Access to technical aids / support	F13.14: The student must get access to technical aids/ support when solving tasks that require this.
B28 - Independence on equipment	F13.15: It must be possible to deliver material produced with other programs, devices.

F14 - Restricted mode

ID	F14
Who	Student/ pupil
What	Sit an examination/ test in a technically restricted environment
Why	To avoid unnecessary distractions, to control which tools are available and to prevent cheating.
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B02 - Assess skills	F14.1: It should be possible to prevent use of tools that interfere with the assessment of skills (e.g. translation tool).
B06 - Final assessment	F14.2: It must be possible to sit the examination in a controlled environment (e.g. a lock down browser).

F15 - Monitoring of test

ID	F15
Who	Teacher
What	Monitor the administration of a test in the classroom
Why	To help students solve their tasks and help them administer their time.
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B04 - Age range	F15.1: It should be possible for a teacher to monitor progress (e.g. number of items answered).
B18 - Proctoring	F15.2: Teacher must be able to monitor student and test progression (make sure they are focused on the test). F15.3: Teacher must be able to see who has delivered a test. F15.4: The teacher should be able to monitor and manage the test administration for a group of students.

F16 - Invigilate examination

ID	F16
Who	Invigilator
What	Invigilate the administration of a test
Why	Check identity, monitor progress (start, delivery, remaining time), technical monitoring and administrative assistance to students.
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B06 - Final assessment	F16.1: The system must have functionality to prevent, detect and stop cheating.
B18 - Proctoring	F16.2: An invigilator must be able to monitor and manage access to examination (authentication, authorization). F16.3: An invigilator must be able to manage individual customization (extra time, access to special needs tools). F16.4: An invigilator must be able to monitor malicious activity, abnormalities. F16.5: An invigilator should have the possibility to send a message to the student. F16.6: An invigilator should be able to monitor large groups (must be able to handle up to 3600 students).

F17 - Supervision of test event

ID	F17
Who	Test manager
What	Supervise administration of test on a high level
Why	Make sure all students get to participate in a test event
Phase	Administration

This requirement is connected to these needs:

Need	Relevance
B23 - Integrations	F17.1: Status messages for start, delivered and marked sent to PAS.

F18 - Manual marking

ID	F18
Who	Marker
What	Assess single answers and give them a score accordingly
Why	To allow for open ended tasks to be used in assessment, and to prepare for analysis of tests
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B17 - Quality assurance	F18.1: It should be possible to randomise order of items for the marker to assure high reliability of score. F18.2: It should be possible to use double blind marking (two persons) as a quality assurance mechanism.
B16 - Assessment criteria	F18.3: Marking tool must display tasks assessment criteria.
B21 - Scoring	F18.4: The marking tool must be efficient for the markers. F18.5: It should be possible to configure marking for both item by item and student by student.

F19 - Comment on scoring

ID	F19
Who	Teacher/ Grader
What	Assess automatically scored answers and give feedback if changes should be considered
Why	The items might have partially correct answers, or faulty scoring setup.
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B06 - Final assessment	F19.1: It should be possible for the graders to give feedback on assessment criteria matters.
B16 - Assessment criteria	F19.2: Teachers and graders should have the possibility to give input on assessment criteria.
B19 - Continuous improvement	F19.3: Input on scoring and assessment criteria should be available for test writers.
B21 - Scoring	F19.4: Teachers/ graders should have the possibility to give feedback on scoring algorithms. Input in scoring might uncover (unintended) flaws in the scoring algorithms.

F20 - Analysis

ID	F20
Who	Psychometrician
What	Perform analysis of test
Why	Create foundation for reports, analysis, grading for tests and examinations.
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B16 - Assessment criteria	F20.1: It should be possible to change/ add what is the correct answer (e.g. "partly correct" alternatives to an item).
B17 - Quality assurance	F20.2: It should be possible to analyse piloted tasks to give feedback on characteristics of a task. F20.3: IRT analysis should have high standard, at least a two-parameter model.
B19 - Continuous improvement	F20.4: It should be possible to use analysis for improvement of next years test/ exam.
B23 - Integrations	F20.5: Task (item) characteristics must be available for PAS to be used in reports.
B26 - Export	F20.6: It should be possible to export results for analysis in external tools. [What data is it possible to get from the proposed system?]

F21 - Grading

ID	F21
Who	Grader
What	Assess complete exam delivery and set an examination grade
Why	To give the student a fair and correct examination grade
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B06 - Final assessment	<p>F21.1: The grader must be able to determine a final examination grade based on the exam delivery.</p> <p>F21.2: The system must have support for plagiarism check.</p> <p>F21.3: When the grader view exam deliveries for grading, the deliveries must be presented in a way that reflect what the student saw when delivering.</p>
B16 - Assessment criteria	<p>F21.4: The grading tool must display tasks assessment criteria.</p> <p>F21.5: The grader should be able to comment on/ contribute to/ affect the assessment criteria.</p>
B19 - Continuous improvement	F21.6: It should be possible for the grader to give feedback to the test writer on the item/ test/ examination.
B20 - Intuitive for external users	<p>F21.7: Results from automatic scored items should be easy to assess for the grader.</p> <p>F21.8: The grader should be able to annotate in the grading view of an exam delivery.</p> <p>F21.9: The grading module is used by large numbers of graders, therefore it has to be very intuitive.</p>

F22 - Create assessment criteria/ matrix

ID	F22
Who	Test writer/ Test manager
What	Finalise assessment criteria/ matrix initiated by the test writer, commented on by graders and analysed by the psychometrician.
Why	To give the graders a fair and correct way to grade the examinations.
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B06 - Final assessment	F22.1: The test writer/ grader should be able to finalise the assessment criteria before final grade is set.
B16 - Assessment criteria	F22.2: The test writer/ grader should be able to work on the assessment criteria through the lifecycle of a task to make sure high quality assessment criteria is made.

F23 - Review of results

ID	F23
Who	Teacher
What	View student responses
Why	To review performance and see achieved score in context
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B01 - Mapping	F23.1: The teacher must be able to view student responses to review the students achievements for following up on mapping assessments.
B10 - Basic skills	F23.2: The teacher must be able to view student responses to review the students achievements for following up on skills assessments.
B11 - Learning support	F23.3: The teacher should be able to view student responses to review the students achievements to support learning.
B12 - Grade support	F23.4: The teacher should be able to view student responses to review the students achievements to support grading.
B16 - Assessment criteria	F23.5: The assessment criteria should be available when the teacher views student responses.
B20 - Intuitive for external users	F23.6: The reports used to review the students responses has to be very intuitive as they might be presented to both teachers, students, parents and school managers.

F24 - Manage data

ID	F24
Who	Manager
What	Export, archive, delete, manage data collected and stored in all part of the system.
Why	To make sure data collected is handled according to mandate and legislation.
Phase	Analysis

This requirement is connected to these needs:

Need	Relevance
B15 - Archiving	F24.1: Data from the system must be available so that the Customer can archive data in the National Archives of Norway. F24.2: A manager must be able to order the deletion of data when the Customer no longer is allowed to store it. F24.3: It should be possible to export data for use by external entities for the purpose of research.
B26 - Export	F24.4: Data exports should be following standards. F24.5: Data exports should be available through APIs.

IF01 - Avoid unnecessary steps

ID	IF01
Name	Avoid unnecessary steps
Description	A user should only be presented with the necessary steps to complete a task, not any unnecessary steps.

Need	Relevance
B05 - Showing competence on the examination	IF01.1: A pupil/ student must not be met with unnecessary steps that steal fokus from the test/ examination.
B20 - Intuitive for external users	IF01.2: A test writer should not have to perform unnecessary steps when producing tests/ examinations.

IF02 - Time behaviour

ID	IF02
Name	Time behaviour
Description	Response and processing times and throughput rates when the system performs its functions must be fast.

Need	Relevance
B24 - Technical availability	<p>IF02.1: No operation in the system should take more than four seconds.</p> <p>IF02.2: Normal simple operations shall take less than one second.</p> <p>IF02.3: If the solution/ system demands more time on certain tasks, this must be done without blocking the user interface and the user must be given information that it is a time consuming task and preferably an indication on how long it will take.</p>

IF03 - Simultaneous users

ID	IF03
Name	Simultaneous users
Description	The solution must handle that the Customer has administration of a large number of simultaneous examination or test, with associated support (teachers, invigilators and the like).

Need	Relevance
B29 - Simultaneous users	<p>IF03.1: The system must be able to scale up to handle campaigns of up to 350 000 simultaneous users where approximately 70-80% of them are students/ pupils taking an exam or test.</p> <p>IF03.2: The system must be able to handle up to 100 000 simultaneous users starting a test.</p> <p>IF03.3: The system must be able to handle normal use of the system by test writers and administrators during campaigns.</p>

IF04 - Integrations with other systems

ID	IF04
Name	Integrations with other systems
Description	The system must integrate with the Customer's system portfolio (according to table below).

Description	Purpose	Standard	System
Token validation	Machine verification	OAuth 2.0	Påloggingssystemet
Single Sign On	Single sign on across the Customer's system portfolio. Unified identification of users across the Customer's system portfolio. Update user role for users authorised by the new system.	OpenID Connect	Påloggingssystemet
Information about tests/ examinations	Link tests/ examinations to test events. Display name of test in PAS. Display test and item details in reports in PAS. Access resources (preview/ scoring etc.) from PAS. Display information on difficulty and attainment level of questions. Display information on metadata of questions.		PASX PASP
Authorise preview of test	PAS has information on who can preview a test.		PASP
Authorise access to test/ examination	PAS has information on who can take a test.		PASX PASP
Authorise access to monitoring of student	PAS has information on who can monitor student-test.		PASX PASP
Authorise access to scoring/ grading a delivery	PAS has information on who can grade deliveries.		PASX PASP
Authorise access to view item or test delivery	PAS has information on who can view deliveries.		PASX PASP
Test/ examination status	PAS need live information on deliveries for monitoring and administration on a high level. PAS has information on absent students.		PASX PASP
Result transfer	Display individual results in reports in PAS. Display individual and aggregated information on attainment level for students/ pupils.		PASX PASP

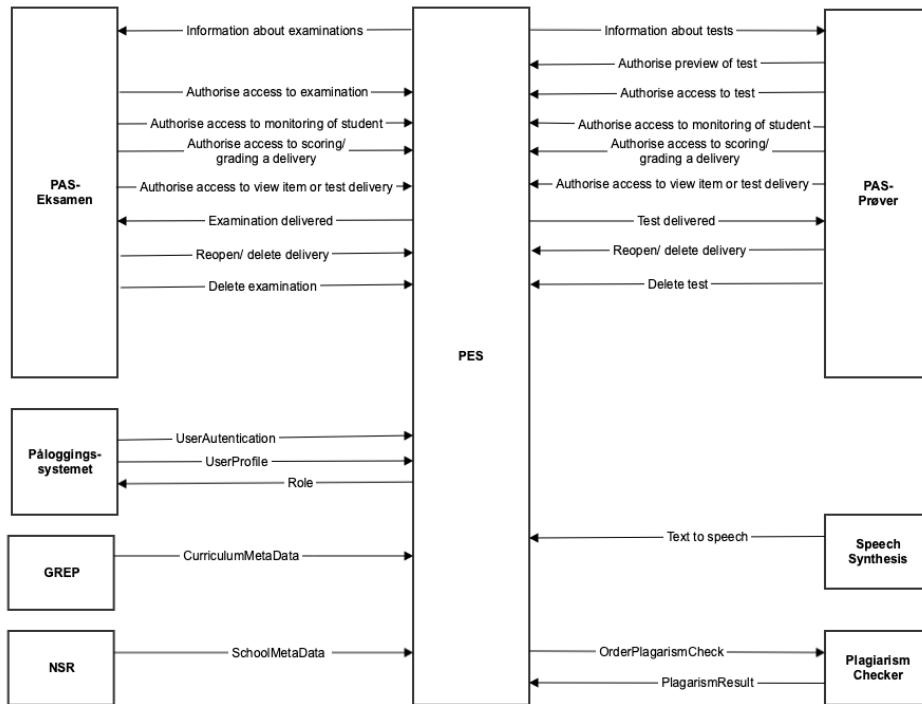
Reopen/ delete delivery	PAS has functionality to reopen access to a test/ examination for a specific student. PAS has functionality to delete a delivery on a test/ examination for a specific student.		PASX PASP
Delete test	PAS has functionality to delete all student content related to a test/ examination (all deliveries, logs)		PASX PASP
School name	Lookup for displaying school metadata.		NSR
Curriculum	Lookup for tagging content using curriculum IDs.		GREP
Speech synteses	Possibility for use of third party speech synteses for text to speech.		
Plagiarism control	Possibility for use of third party plagiarism where applicable.		

See Tender Specification, Appendix 3 - Background for a new system for tests and examinations.

This requirement is connected to these needs:

Need	Relevance
B14 - Languages	IF04.1: When starting a test or exam, the correct language version must be presented (based on the students language settings).
B23 - Integrations	IF04.2: Starting a test or exam must use single sign on. IF04.3: System must handle metadata connected to each student (e.g. language, special needs) IF04.4: High level status of a test or exam must be traceable in PAS (test management system).

Illustration of integration between the new system (PES) and the Customer's system portfolio:



IF05 - User interface

ID	IF05
Name	User interface
Description	The user interface must be customisable to adhere to the Customer's design and language requirements.

Need	Relevance
B14 - Languages	<p>IF05.1: The user interface for students must be available in the language forms Norwegian bokmål (BM), nynorsk (NN), nordsamisk (North Sami), lulesamisk (Lule Sami) and sørsamisk (South Sami)</p> <p>IF05.2: The system should have system support for translations of user interface.</p>
B20 - Intuitive for external users	<p>IF05.3: All user interface must be available in Norwegian bokmål (BM) and English.</p> <p>IF05.4: The user interface should be available in the Customer's graphical design profile.</p> <p>IF05.5: The logo (branding) of the system must use the Customer's logo.</p> <p>IF05.6: The system shall not brand products or vendors to the Customer's users.</p>

The Customer will manage translation and cover costs for the translations.

IF06 - Supported devices

ID	IF06
Name	Supported devices
Description	The system must be available on most common devices and browsers.

Need	Relevance
B28 - Independence on equipment	IF06.1: The student must be able to sit a test/ examination on most common browsers and devices.

Supported browsers and devices in existing examination system:

<https://www.udir.no/eksamen-og-prover/eksamen/administrere-eksamen/#tekniske-krav>

Supported browsers and devices in existing test system:

<https://www.udir.no/eksamen-og-prover/prover/IP-adresser-prover/>

IF07 - Accessibility

ID	IF07
Name	Accessibility
Description	The system must be universally accessible.

Need	Relevance
B13 - Accessibility	IF07.1: The system must comply to current regulation for universal accessibility (https://lovdata.no/dokument/SF/forskrift/2013-06-21-732) IF07.2: Starting a test or exam must be easy so that the system does not impose barriers for students with special needs. IF07.3: When starting a test, the correct version of the test must be presented (based on special needs settings). IF07.4: Delivering a test or exam must be intuitive for students using tools for accessibility.
B02 - Assess skills	IF07.5: The system must be configurable to avoid use of tools for universal accessibility when they conflict with the measurement of skills.
B05 - Showing competence on the examination	IF07.6: The system must handle individual configuration of tools for universal accessibility for students with special needs.
B08 - The nature of the subjects	IF07.7: The system must be configurable to avoid use of tools for universal accessibility when they conflict with the measurement of subjects.

IF08 - User experience

ID	IF08
Name	User experience
Description	Use of the system on different devices and with different support tools should not detract the user experience.

Need	Relevance
B13 - Accessibility	IF08.1: Use of aids for accessibility should not detract the user experience (e.g. braille).
B28 - Independence on equipment	IF08.2: The system must be responsive to devices and screen size, both small and large.

IF09 - Error messages

ID	IF09
Name	Error messages
Description	Error messages should be descriptive and meaningful for end users.

Need	Relevance
B14 - Languages	IF09.1: Error messages should as far as possible be in Norwegian.
B20 - Intuitive for external users	IF09.2: Error messages originating from third party components should be handled by the system.

IF10 - Recoverability

ID	IF10
Name	Recoverability
Description	The system must be recoverable, and be able to recover data affected by an event of interruption or system failure.

Need	Relevance
B05 - Showing competence on the examination	IF10.1: The system must continuously store student responses, and these must be available if a student change device.
B24 - Technical availability	IF10.2: The system must have backup routines. IF10.3: It should be possible to roll back to previous versions of the system. IF10.4: It must be possible to recover data.
B30 - Information security	IF10.5: Recoverability routines must not compromise information security.

IF11 - Availability

ID	IF11
Name	Availability
Description	The system must be available during test and examination administration.

Need	Relevance
B24 - Technical availability	IF11.1: The system must be available during examination. IF11.2: The system must be available during large test administrations. [Describe what requirements your system have for starting, and for delivering an exam.] [Describe what consequences a loss of internet has for the student.]
B28 - Independence on equipment	IF11.3: The system must be available on equipment that receive an automatic system upgrade.

IF12 - Access to data

ID	IF12
Name	Access to data
Description	The system must control that only those who should have access to production data get access to it.

Need	Relevance
B30 - Information security	<p>IF12.1: Contractors and subcontractors can only get access to data if they have an agreement with the Customer (location of data and staff: EEA/ EFTA)</p> <p>IF12.2: No production data can be stored or accessed in other environments (test/ stage).</p> <p>IF12.3: The Customer must on request get access to all data belonging to the Customer.</p> <p>IF12.4: It must not be possible to get access to data without proper authentication and authorization.</p> <p>IF12.5: All data classified as sensitive must be secured with two-factor authentication.</p> <p>IF12.6: It should be possible to trace who has accessed data in the system.</p>

IF13 - Location of data

ID	IF13
Name	Location of data
Description	Data cannot be stored outside EU/ EEA

Need	Relevance
B30 - Information security	IF13.1: The system must have data processor agreements covering all subcontractors relevant for the Customer's data. IF13.2: The system (including third party tools and subcontractors) must comply to GDPR. IF13.3: Describe how data at rest is protected.

IF14 - Transportation of data

ID	IF14
Name	Transportation of data
Description	All transportation of data must be encrypted.

Need	Relevance
B30 - Information security	IF14.1: System - client requests must be encrypted. IF14.2: System - system requests must be encrypted. IF14.3: API endpoints must be encrypted.

IF15 - Test environments

ID	IF15
Name	Test environments
Description	A staging environment must be available and configured to communicate with the Customer's systems staging environments.

Need	Relevance
B23 - Integrations	IF15.1: Staging environment must be integrated with staging environments of all systems mentioned in IF04 - Integrations with other systems .

IF16 - Documentation

ID	IF16
Name	Documentation
Description	The system must be well documented.

Need	Relevance
B23 - Integrations	IF16.1: Configuration of integrations must be documented on the Customer's systems.
B24 - Technical availability	IF16.2: The documentation must include a list of all system specific terminology. IF16.3: The documentatsion must be in accordance with the Customer's documentation guidelines. IF16.4: The Contractor must make all relevant system documentation available for the Customer. IF16.5: Documentation of the system must be made available to the Customer.

Glossary

Title	English	Norsk	Description
Adaptive test	Adaptive test	Adaptiv prøve	An adaptive tests adapts to the students level of ability during the course of the test.
Administration	Administration	Gjennomføring	Administration of tests and examinations is when the pupils sit the test or the student sits the examination. Administration includes monitoring/ proctoring/ invigilation of the pupils and students.
Administration phase	Administration phase	Gjennomføringsfasen	In the administration phase the exams or tests are administered to the candidates/pupils. The phase starts when the exams or tests are finalized and ends with the delivery of responses. The next phase is the analysis phase.
Analysis phase	Analysis phase	Analysefase	The process in which assessment, analysis and publishing of results take place. The process starts with the students replies to the tasks and end with reports with results and meta data for further development of the tasks.
Answer	Answer / Response	Oppgavesvar	The answer is the students reply to an item.
Assessment	Assessment	Vurdering	A collection of all kinds of assessment, including tests and exams (https://lovdata.no/NL/lov/1998-07-17-61/§2-3 , https://lovdata.no/SF/forskrift/2006-06-23-724/§3-1). Includes summative and formative, assessment for learning.
Basic skills	Basic skill	Grunnleggende ferdighet	There are five basic skills in the curriculum, reading, writing, oral skills, numeracy and digital skills. These skills are a prerequisite for learning and to be able to show competence in subjects. CF. https://www.udir.no/laring-og-trivsel/lareplanverket/grunnleggende-ferdigheter/rammeverk-for-grunnleggende-ferdigheter/1-innledning/
Campaign	Campaign	Gjennomføringsperiode	A campaign is a set period of time where the Customer administers a set of examinations or tests. The main campaigns are: <ul style="list-style-type: none"> • Spring examination • Mapping tests • National tests • Autumn examination
Candidate	Candidate	Kandidat	Person that is going to take, is taking or have taken an exam.
Competence	Competence	Kompetanse	Competence is the ability to acquire and use knowledge and skills to master challenges and to solve tasks in known and unknown situations. Competence includes understanding and the ability to reflect and to think critically.
Event	Event	Arrangement	An event relates a test to a date and a group of pupils. This relation is done in the test management system. (For examinations the term Eksamen is used for event)

Exam commission	Exam commission	Eksamenemnd	The exam commission consist of 2-6 task writers. They are recruited from schools or relevant professions. The exam commission is to write, revise and finalize exams in a subject.
Exam period	Exam period	Eksamenperiode	Final written exams are administered two periods each year, in the spring and in the autumn. Each exam periode is considered one campaign.
Examination	Examination	Eksamen	Examinations are written final assessment where the student are to be given the opportunity to show their competence by solving a complex task or challenge. Examinations are regulated by the Education act with regulations. See https://www.udir.no/eksamen-og-prover/eksamen/
Examination modes	Examination modes	Eksamenform	Examination modes can be written, oral or oral and practical. The Ministry of Education sets examination modes in every subject. The exam mode can be found in the subject curriculum.
Feide	Feide	Feide	Common Digital Identity/Feide is the Ministry of Educations chosen solution for safe digital identification in the education sector. Feide uses the concept federated indentity handling. See https://www.feide.no/om-feide Påloggingssystemet is integrated with Feide and ID-porten, and handles all authentication for Udir's system portfolio.
Formative tests	Formative tests	Læringsstøttende prøver	Formative tests test the pupils' basic skills and can be used as a tool in formative assessment and help the teacher sustain a formative dialogue with pupils at all levels. The tests are voluntary, and schools decide for themselves when they want to conduct the tests.
Grading	Grading	Sensur	Grading is done by trained graders. They are often teachers. The process includes assessing individually first and then to meet other graders to set the final grade.
Grep	Grep	Grep	The Customer's system for subject, subject curriculum and subject codes. See http://grewiki.udir.no/
Item bank	Item bank	Oppgavebank	An item bank contains items to be used in a test or an examination. May also be a part of an adaptive test.
Item characteristic	Item characteristic	Oppgavekarakteristikk	The item characteristics are metadata about the items difficulty level, discrimination and level of guessing.
Item type	Item type	Oppgavetype	The item type defines the interaction between the student and the item. i.e. multiple choice, short answer or listening test.
Mapping tests	Mapping tests	Kartleggingsprøver	There are both obligatory and voluntary mapping tests in reading, numeracy, English and digital skills. The tests are aimed at pupils in Years 1 to 4. The tests are designed to identify pupils who require additional help and support.
Marking	Marking	Skåring	The process of manually assessing a response and giving a score.
National tests	National tests	Nasjonale prøver	The purpose of national tests is to provide schools with information about the pupils' skills in reading, numeracy and English. The results from the tests form the basis for formative assessment and quality development at all levels in the education system. The reading and numeracy tests take place in Years 5, 8 and 9 and the English tests in Years 5 and 8. National tests provide information about individual pupils, groups, year groups and schools that teachers and school leaders need in order to improve quality.

PGS	PGS - Test/exam administration system	PGS - Prøvegjennomføringssystem	PGS is a collective name for all the test and examinations systems used by the Customer. They consist of: PGSA, PGSC, PGSD and PGSF.
Preparation materials	Preparation material	Forberedelsesmaterieell	The preparation material is given to the candidates the day before the exam. It typically consists of text and pictures.
Primary and lower secondary school	Primary and lower secondary school	barne- og ungdomsskole	Obligatory schooling in Norway. Primary: Year 1-7, pupils aged 5 to 12. Lower secondary: Year 8-10, pupils aged 12 to 16.
Production phase	Production phase	Produksjonsfase	The production of assessment material, including items, and the setup of the event
Pupil	Pupil	Elev	A pupil is a child that goes to school. See http://regbok.udir.no/35004/3344/35042-1014314.html
Påloggingssystemet	Påloggingssystemet	Påloggingssystemet	Påloggingssystemet is integrated with Feide and ID-porten, and handles all authentication for Udir's system portfolio.
Results	Results	Resultat	The results are a representation of the students achievement on a test or an exam. Examples can be grades, score, theta.
SAS	SAS	SAS	School management systems. Integrated with PASX and PASP in order to simplify registration for tests and exams for schools and for retrieving exam results.
Standard system	Standard system	Standard system	A standard system is a system not developed specifically for the Customer. Can be used by many customers.
Subject	Subject	Fag	The subjects have a subject curriculum that defines the content and learning objectives. See https://www.udir.no/laring-og-trivsel/lareplanverket/
Summative tests	Summative tests	Karakterstøttende prøver	Summative tests in science and social science are designed to assist with formative assessment in the subjects. Information from the tests should also help link formative assessment to the final assessment.
Task	Task	Oppgave	A task is a part of a test or an exam. A task is answered during the test or exam. It can be open ended or different kinds of multiple choice.
Test	Test	Prøve	A test is a collection of items put together for the purpose of measuring a skill or a subject. I.e. National tests in reading 5th grade.
Test group	Test group	Prøvegruppe	A test group is a group of pupils that is registered for a test. The user role "prøvegruppeansvarlig" follows up the conduction of the tests.
Test player	Test player	Prøveavspiller	The test player is the tool presenting the tasks in a test or exam to the student, and makes it possible for them to give an answer.

Test types	Test types	Oppgave typer	<p>The Customer have five different test types:</p> <ul style="list-style-type: none"> • final examinations • national tests • mapping tests • summative tests • formative tests
Test writer	Test writers	Oppgave utvikler	<p>Test writers produce tasks to be used in tests and exams.</p> <p>Tests writers range from teachers to university professionals with specialised competence within the subject. Test writers work by appointment for the Customer.</p> <p>A group of test writers making exams can be referred to as "exam commission"</p>
Test /examination paper	Test /examination paper	Besvarelse	<p>The examination/test paper is the product that the pupil/candidate produces during the test/examination. One paper per pupil/candidate per test/examination. The paper is to be assessed.</p>
Theta	Theta	Theta	<p>The theta is a measurement of the ability level in a given test. Theta is found in an IRT analysis.</p>
Unit of items	Unit of items	Oppgave sett	<p>A collection of items that is to be completed by a student in the conduction phase of a test or an examination.</p>
Upper secondary school	Upper secondary education	Videregående skole	<p>Voluntary schooling for year 11-13, pupils aged 16 to 19.</p> <p>Includes academic and vocational studies. To attend higher education requires having completed upper secondary education.</p>